

H. B. ANDERSON.
 STARTING DEVICE FOR INTERNAL COMBUSTION ENGINES.
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1,044,118.

Patented Nov. 12, 1912.

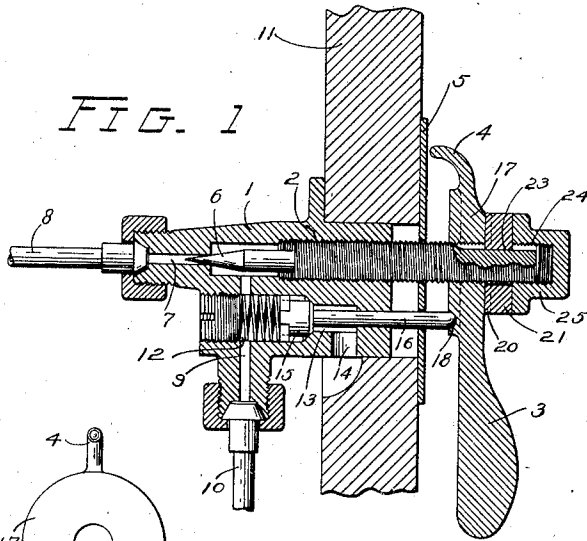


FIG. 1

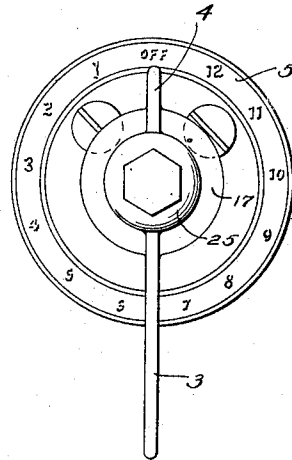


FIG. 2

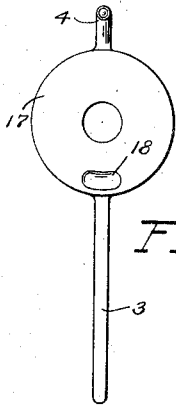


FIG. 3

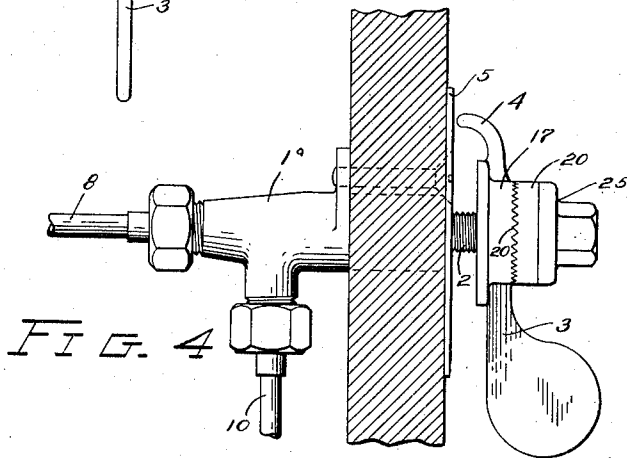


FIG. 4

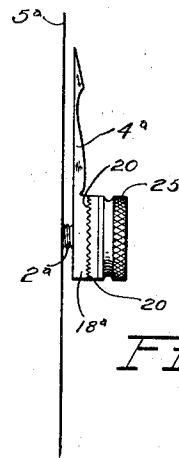


FIG. 5

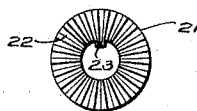


FIG. 6

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STARTING DEVICE FOR INTERNAL-COMBUSTION ENGINES.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HAROLD B. ANDERSON, a citizen of the United States, residing at Lakewood, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Starting Devices for Internal-Combustion Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to starting devices for internal combustion engines, whereby the operation of the engine can be commenced without the usual laborious cranking. Such mechanism may be divided into three generic types: first, those in which the operation of the engine is commenced by the unwinding of a spring in which potential energy has been stored during the previous operation of the engine; second, those in which the operation of the engine is begun by means of the admission to the cylinders in proper order of compressed gas of some sort stored in a suitable receptacle; and, third, those in which the operation of the engine is commenced by means of the explosion in the cylinders of a charge of gas introduced therein either prior to the stopping of the engine at its previous operation or in some other manner.

It is, of course, a well known fact that an engine will sometimes start from the spark by reason of an explosive gasoline mixture remaining in the cylinders from the previous operation, but this operation is uncertain and unreliable, owing to deterioration and leakage of gasoline mixture. It has heretofore been proposed to employ for starting purposes a mixture of acetylene and air introduced into the cylinders at the time of stopping the engine, acetylene being chosen for the purpose because of its wide range of explosiveness, its freedom from decomposition, and the force of its explosion. The acetylene gas necessary for this purpose is obtained from the usual lighting tank and is supplied to the cylinder by means of some type of valve mechanism.

Certain devices have been proposed, prior to my invention disclosed herein, for the purpose of supplying acetylene mixed with air to the engine cylinders, but most of these devices have been complicated and expensive, prone to leakage, and unreliable in operation.

The object of this invention is, therefore,

the provision of new and improved devices for admitting acetylene mixed with air in the right proportions to the cylinder of an explosive engine for the purpose of starting the same, the chief points of superiority of the present device over previous devices being those of simplicity, economy, reliability, freedom from leakage, and cheapness of manufacture.

This invention also relates to a connection whereby a radial handle, arm, or pointer may be adjustably secured to a rotatable shaft, stem, or spindle, and has particular reference to a connection whereby the handle of a valve may be secured to its stem or a pointer secured to a valve stem or other rotatable member in such fashion as always to register correctly with the dial graduations with which it coöperates. Many different expedients have heretofore been employed for this purpose but the same have been deficient either in failing to permit relative adjustment or in not securing the parts tightly in place, the result being that upon the wearing of the valve parts or the slipping of the handle on the stem the pointer would fail to accord properly with its scale. It is also a well known fact that the usual method of securing the hand or pointer of an indicator to its spindle is very clumsy and inefficient, the result being that the hand frequently becomes displaced and indicates an improper reading. It is also frequently the case that the handle of a valve is called upon to effect some secondary result at a given point in the opening or closing of its valve, such as to make or break an electrical connection or to operate a related valve, and this necessitates an adjustable connection between the handle and valve stem so that the secondary action will take place at a fixed time with respect to the closing of the valve itself.

All the above objects and other objects yet to be disclosed are attained by the use of my invention, for a complete understanding of which reference should be had to the drawings accompanying and forming part of this application, wherein:

Figure 1 is a longitudinal cross sectional view through my improved starting device showing my improved connection associated therewith; Fig. 2 is a right hand end view of the same; Fig. 3 is a bottom plan view of the valve handle; Fig. 4 represents a side elevation of a valve of slightly different type

equipped with my improved connection; Fig. 5 is an edge view of an indicator dial showing the application of my connection to the pointer or hand; and Fig. 6 is an inside face view of the washer which forms an essential part of my improved connection.

Describing the parts by reference characters, particular attention being given to Figs. 1 to 3, 1 represents a valve casing having a suitable aperture into which is threaded a stem 2, and to the outer end of this stem is secured a handle 3 provided with a pointer 4 movable over a scale 5. The particular valve shown in Fig. 1 has a needle point 6 adapted to enter and close a passageway 7 communicating with the conduit 8 which is connected to a gas supply tank (not shown), the chamber surrounding the needle being in communication with a passageway 9 communicating with a conduit 10 which leads to the intake manifold (not shown) of an internal combustion engine for supplying the same with gas for starting purposes, the valve casing being here shown as mounted upon a dash board 11. The passageway 9 is intersected by a recess 12 having an axial extension 13 parallel to the stem 2, said extension communicating with the outer air through a port 14. Seated upon a shoulder between the recess and its extension is a spring-pressed valve 15 having a stem 16 extending through the plate 5 adjacent to the stem 2, the outer end of the stem 16 preferably being rounded.

The valve handle 3 is formed with a hub 17 having a substantially flat bottom surface which is provided at one point with an arcuate recess 18 adapted to receive the end of the stem 16 to permit the valve 15 to be seated by its spring. The position of the recess 18 is such as to cause the valve 15 to assume its closed position at the time when the pointer 4 points toward the "off" or zero position of the dial, and the adjustment between the valve handle and the stem 2 is such as to cause the valve needle 6 to be exactly seated at this time, this adjustment being preferably accomplished by means of the connection now to be described.

In order to secure the handle to the valve stem the hub thereof is internally threaded so as to be screwed adjustably thereon, the outer face of the hub being formed with radial serrations 20. An annular washer 21 is then slipped over the end of the stem so as to engage the hub, the inner face of said washer being formed with serrations 22 engaging the serrations 20, said washer also having an inwardly projecting finger 23 engaging a longitudinal slot 24 formed in the end of the valve stem. The washer is pressed into engagement with the hub by means of a nut 25.

The operation of the engine is stopped by preventing the ignition of the charges in the

cylinders as by opening the sparking circuit, and as the speed of the engine decreases, the handle 3 is shifted so as to open the valve by an amount found by former experience to be about right for the particular engine with which the starter is used. This movement of the valve handle opens the passage through the conduit 8 by an amount necessary to deliver the proper quantity of acetylene and at the same time forces the valve stem 16 inwardly so as to admit air through the port 14 to mix with the acetylene, the mixture of the two gases being drawn into the cylinders by suction. As soon as the engine stops, the valve handle is returned to "off" position, thus closing the needle valve 6 and permitting the re-seating of the air valve 15 by its spring. The recess 18 is made of elongated shape in order to avoid the necessity of bringing the handle back to an exact fixed position. The object of using the valve 15 is to prevent air from being drawn through the conduit 10 into the manifold of the engine during its normal operation by gasolene, since the air so admitted would tend to disturb the proportions of the fuel mixture. My improved starting device can also be employed for continued operation of the engine in case the gasolene supply becomes exhausted.

The valve illustrated in Fig. 4 is of much the same type as that shown in Fig. 1 and comprises a casing 1^a having conduits 8 and 9 secured thereto and provided with a similar threaded stem 2. The remaining parts are the same as those above illustrated and described and are similarly numbered, the sole difference being in the omission of the air inlet valve together with its stem and the corresponding omission of the recess 18. In this instance the sole object of the adjustment of the handle is to cause the pointer 4 thereof to register correctly with the graduations of the scale 5. This valve may be employed either for the lamps or the starting mechanism of an automobile or for any other location where a valve is desired. When used as an engine starter, undiluted gas is delivered by the conduit 10 to the intake manifold as before, the necessary air being admitted through the usual throttle.

In Fig. 5 I have illustrated the application of my improved connection to an indicator or gage dial, the same comprising a scale 5^a, a spindle or arbor 2^a and a handle 4^a, said handle having a hub 18^a threaded upon the spindle or arbor and provided with serrations 20 on its outer face, the washer 21 and nut 25 being employed as in the preceding instance.

It will be understood that many changes in details of construction and arrangement of parts can be made in my improved starter without sacrificing the advantages thereof or departing from the scope of my inven-

tion. It will also be understood that the uses and embodiments of the connection disclosed herein are illustrative merely and that said connection is applicable in any case in which a handle is to be connected to a rotating member, or in which an indicating pointer is to be connected to a spindle or arbor, whether that rotating member be the stem of the valve or other device, or whether that spindle be a part of a gage, clock, speed indicator, compass, or the like.

While I have described my invention in detail, I do not, therefore, propose to be limited to such details, except as the same may be positively included in the claims hereto annexed, or may be rendered necessary by the prior state of the art.

Having thus described my invention, what I claim is:

1. In a starting device for internal combustion engines, the combination, with a casing having a chamber therein and an air inlet port communicating with said chamber, of a conduit for conveying gaseous hydro-carbon to said chamber, a valve member for controlling the passage through said conduit, a valve member for controlling the admission of air through said port, a conduit for conveying mixed air and gas to the engine cylinders and means whereby said valves will be opened and closed substantially simultaneously.

2. In a starting device, for internal combustion engines, the combination, with a casing having a chamber therein and an air inlet port communicating with said chamber, of a conduit for conveying gaseous hydro-carbon to said chamber, a rotatable valve member for controlling the passage through said conduit, a second valve member for controlling the admission of air through said port, a conduit for conveying mixed air and gas to the engine cylinders, a handle adjustably connected to said first valve member, and means carried by said handle for opening said second valve member when said first valve member is opened and for closing the same when said first valve member is closed.

3. In a starting device for an internal combustion engine, the combination, with a casing having a chamber therein and a threaded stem rotatably mounted in said chamber, there being a second chamber in said casing communicating with said first chamber and a port connecting said second chamber with the outside air of a conduit for conveying gaseous hydro-carbon to said first chamber, a needle point carried by said stem and regulating the passage of hydro-carbon into said first chamber, a valve member in said second chamber and closing said port, said second valve member having a stem substantially parallel with said first stem, a handle adjustably secured to said

first valve stem and having a portion adapted to engage the stem of said second valve member to operate the same, and means for placing said second chamber into communication with the engine cylinders.

4. In a starting device for an internal combustion engine, the combination, with a casing having a chamber therein and a port connecting said chamber with the outside air, there being a passage in said casing for conveying gaseous hydro-carbon to said chamber, of a valve controlling said passage and having a rotatable stem, a valve member in said chamber for closing said port, said second valve member having a stem substantially parallel with said first stem, a spring for holding said second valve member normally in closed position, a handle adjustably secured to said first stem and having a cam portion adapted to engage the stem of said second valve member to unseat the same when said first valve member is unseated, and means for placing said chamber into communication with the engine cylinders.

5. In a starting device for explosion engines of the type having an inlet manifold and a throttle, there being an inlet valve between said manifold and each of the engine cylinders, in combination, a valve casing, a conduit for supplying fixed hydro-carbon gas to said casing, a conduit connecting said casing with said manifold at a point between said throttle and said inlet valve, and a measuring valve in said casing and adapted to control the passage therethrough.

6. In a starting device for explosion engines of the type having an inlet manifold and a throttle, there being an inlet valve between said manifold and each of the engine cylinders, in combination, a valve casing, a conduit for supplying fixed hydro-carbon gas to said casing, a conduit connecting said casing with said manifold at a point between said throttle and said inlet valve, a rotatable valve member in said casing and adapted to control the passage therethrough, a dial for said valve member, and a pointer adjustably secured to said valve member and cooperating with said dial.

7. In a device of the character described, the combination with a rotatable member, of a second member rotatably mounted and having a serrated face, said first member being formed with a longitudinal groove, a washer having a serrated face adapted to engage the corresponding face of second member and having a finger adapted to engage said groove, and means whereby said washer may be clamped against said second member.

8. In a device of the character described, the combination with a rotatable member, of a second member threaded thereon, a washer slidably mounted on said rotatable member

and non-rotatably interlocked therewith, the adjacent faces of said washer and second member being formed with interengaging portions, and a nut secured to said first member outside of said washer whereby said washer is clamped against said second member.

9. In a device of the character described, the combination, with a rotatable member having threads, of a second member having threads meshing with the threads of said first member, a part longitudinally movable with respect to said first member and non-rotatably interlocked therewith, interengaging means carried by said part and said first member for preventing relative rotation thereof, and means for securing said part in engagement with said first member.

10. In a device of the character described, the combination, with a rotatable member having a generally cylindrical portion, of a second member rotatively but not translatably mounted on said cylindrical portion, a third member translatably but not rotatably mounted on said cylindrical portion, said second and third members having their adjacent faces shaped for interengagement and means engaging said first member and third member for maintaining said third member in engagement with said second member.

11. In a device of the character described, the combination, with a graduated scale and a rotatable member having threads, of a pointer cooperating with said scale and having a hub threaded to said rotatable member, a part longitudinally movable with respect to said first member and non-rotatably interlocked therewith, interengaging means

carried by said part and said hub for preventing relative rotation thereof, and means for securing said part in engagement with said hub.

12. In a device of the character described, the combination, with a circular dial and an externally threaded rotatable member concentric therewith, said rotatable member having a longitudinal groove intersecting the threads thereon, of a pointer cooperating with said dial and having a hub threaded to said rotatable member, a washer longitudinally movable with respect to said first member and having a projection engaging said groove, interengaging means carried by said washer and said hub for preventing relative rotation thereof, and a nut threaded on said rotatable member for securing said washer in engagement with said hub.

13. In a device of the character described, the combination, with a graduated scale and a rotatable, externally threaded member having a longitudinal groove intersecting said threads, of a pointer cooperating with said scale and having a hub threaded upon said rotatable member, said hub having a serrated face, a washer surrounding said threaded member and having serrations engaging said first serrations and having a portion interlocked with said groove, and a nut threaded upon said member and clamping said washer against said hub.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

HAROLD B. ANDERSON.

Witnesses:

BYRON B. BROCKWAY,
W. A. WALKEMEYER.